Washington State Enhanced Hazard Mitigation Plan

Best Available Science

Best Available Science Guidance

While this plan provides some examples of Best Available Science, the Washington State Department of Commerce (formerly Washington State Office of Community Development) adopted administrative rule guidance in August 2000 (Chapters 365-195-900 through 925 WAC) to assist cities and counties in determining what is the best available science, where to obtain it, how to include it in land use management policies and regulations, and what to do if there is no available valid scientific information. Department of Commerce remains the subject matter experts in this effort, and the intent behind this plan is to assume the same guidelines as indicated by the referenced WAC codes.

Scientific information can be produced only through a valid scientific process. To ensure that the best available science is being included in policies and regulations, a county or city should consider the "characteristics" of a valid scientific process and common sources of scientific information [see Chapter 365-195-905(5) WAC].

In the context of critical areas protection, a valid scientific process is one that produces reliable information useful in understanding the consequences of a local government's regulatory decisions. Chapter 365-195-905(2) WAC states that the Department of Commerce will make available a list of resources that state agencies have identified as meeting the characteristics of the best available science. This information is available through Commerce's publication, *Citations of Recommended Sources of Best Available Science for Designating and Protecting Critical Areas*, available at: http://www.commerce.wa.gov/DesktopModules/CTEDPublications/CTEDPublicationsView.aspx?tabID=0&ItemID=5573&MId=944&wversion=Staging

As science is a dynamic process and new science and new interpretation of existing work occur continually, it is impossible to present all of the science in a single source that may be appropriate for use in decision making and plan development. The publication referenced is the product of a multistate agency effort to provide current information that may be used as the best available science. The Department of Commerce plans to update this information annually.

The sources provided below are but a sampling of information available for use by local jurisdictions as they develop their hazard mitigation plans. These are the sources which

the State relies upon, in part, for development of the SHMP. There are many open-sources of data available, but caution must be used when seeking this information. Peer review is essential, as are validated studies. The intent behind mitigation planning is not to make the jurisdictions create new information, but to utilize already existing data where gaps exist. However, if the local jurisdiction has the ability to conduct a valid study that will benefit the body of the whole, and the information is validated, local jurisdictions are encouraged to provide that data to the State for inclusion in this document.

A list of the various types of hazards and planning initiatives is below (click on the types to hyperlink to those sections).

All Natural Hazards

Drought

Earthquake

Flood

Landslide

Severe Storms

Tsunami

Volcano

Wildfire

Growth Management – Critical Areas

All Natural Hazards

The Natural Hazards Center: funded by a consortium of federal agencies and located at the University of Colorado, the center's goal is to strengthen communication among researchers and the individuals, organizations, and agencies concerned with reducing damages caused by disasters. The website contains updated information and links to publications, organizations, and other internet resources for hazards research and practice. www.colorado.edu/hazards/

HAZUS-MH: FEMA's methodology for estimating potential losses from disasters. Current scientific and engineering knowledge is coupled with the latest geographic information systems (GIS) technology to produce estimates of hazard-related damage before, or after, a disaster occurs. www.fema.gov/plan/prevent/hazus

WAHUG Users Group: this group provides HAZUS-MH support and guidance for Washington State residents, businesses, and local government agencies interested in utilizing HAZUS-MH for mitigation and analysis purposes. www.usehazus.com/wahug

iNWS: the home of new mobile and desktop innovations of the National Weather Service. iNWS strives to fulfill our mission of protecting life and property by using new technology to reach out to our customers. A person must register on the iNWS website: http://inws.wrh.noaa.gov . Once the registration has been approved, a new "Alert Area"

must be defined under the my iNWS link. Alert Areas can be for a county, a zip code, address, city, landmark, or custom areas defined by the user. In addition to selecting the alert area, there are choices for what type(s) of alerts is (are) preferred. The options of alerts to receive are: Severe Weather, Winter Weather, Hydrology, Fire Weather, Marine Weather, Coastal hazards, Tropical Weather, Aviation, Non-Precipitation, or Civil Emergency. Additional information can be found on the website referenced above or by contacting your local National Weather Service.

National Weather Service (NWS) Web Sites:

Four NWS forecast offices serve Washington, from Seattle, Spokane, Pendleton and Portland. Their web sites offer a wealth of information that supports the four phases of emergency management - mitigation, preparedness, response, and recovery. Key web site elements include the Area Forecast Discussion, latest outlooks, watches, warnings and advisories, climatic/historical data resources, the Advance Hydrologic Predictive Service or AHPS, and digital forecasts including GIS mapping forecast fields.
www.weather.gov

USGS sites:

Science in Your Backyard: links directly to a multitude of sites with specific natural hazards information on the state, including real-time information.
www.usgs.gov/state/state.asp

Natural Hazards Gateway: provides links to information on all the natural hazards.
www.usgs.gov/hazards

Drought

USGS Drought Watch: the site provides numerous links to drought specific resources.
wa.water.usgs.gov/news/drought/resources.html

Earthquake

USGS Earthquake Hazards Program: the program has a site devoted specifically to the earthquake hazards in the Pacific Northwest region and includes research and links to other useful earthquake related information for the region.
earthquake.usgs.gov/regional/pacnw

The program also includes ShakeMap, which can provide near-real-time maps of ground motion and shaking intensity following significant earthquakes. Actual ShakeMaps for the state are included at the end of this section.
earthquake.usgs.gov/earthquakes/shakemap

The Pacific Northwest Seismic Network: site maintained by the University of Washington and includes links to a variety of earthquake related research, data, and news. www.ess.washington.edu/SEIS/PNSN

Flood

FEMA Map Service Center: this site allows users to download digital versions of FEMA's Flood Insurance Rate Maps (FIRMs) and create FIRMettes (small sections of a FIRM that can show individual properties) for use in Hazard Mitigation Planning and Project development.
msc.fema.gov/webapp/wcs/stores/servlet/FemaWelcomeView?storeId=10001&catalogId=10001&langId=-1
Additionally, see the Flood Section in Tab 5 for information on FEMA's Map Modernization and RiskMAP programs.

Community Collaborative Rain, Hail, and Snow Network (CoCoRaHs): a unique, non-profit, community-based network of volunteers working together to measure and map precipitation (rain, hail, and snow). www.cocorahs.org/state.aspx?state=wa

National Weather Service – Northwest River Forecast Center: streamgage real-time and historical data including a geographical representation of the available streamgages. The site also has links to summaries of past flooding events and the factors that led to those events. www.nwrfc.noaa.gov

USGS Water Data For the Nation: provides access to water-resources data collected at sites in the state. This information can be useful in documenting certain information for hazard mitigation project applications as well as providing historical information in hazard mitigation plans. nwis.waterdata.usgs.gov/nwis

US Army Corps of Engineers – Northwestern Division Dataquery: site provides a hydrometeorological data (e.g. flow, precip, etc.) search engine for the northwestern region of the US. The user can enter a river, dam, or station name and find historical data. This can be useful in documenting certain information for hazard mitigation project applications as well as providing historical information in hazard mitigation plans. www.nwd-wc.usace.army.mil/perl/dataquery.pl

Landslide

USGS Landslide Hazards Program: the program gathers information, conducts research, and produces scientific reports and other products for planners and decision makers from all government entities. landslides.usgs.gov

Washington State Department of Natural Resources also provides landslide data, available at the following sites:

http://www.dnr.wa.gov/BusinessPermits/Topics/LandslideHazardZonation/Pages/fp_lhz_completed.aspx

http://wigm.dnr.wa.gov/

Various other landslide data:
http://www.dnr.wa.gov/ResearchScience/Topics/GeologicHazardsMapping/Pages/landslides.aspx

Report a Landslide:
http://www.dnr.wa.gov/ResearchScience/HowTo/GeologyEarthSciences/Pages/report_a_landslide.aspx

Geologic hazards in general are located at:
http://www.dnr.wa.gov/ResearchScience/Topics/GeologicHazardsMapping/Pages/geologic_hazards.aspx

Severe Storms

National Severe Storms Laboratory: NOAA's program to serve the nation by working to improve the lead-time and accuracy of severe weather warnings and forecasts in order to save lives and reduce property damage.
www.nssl.noaa.gov

Storm Prediction Center: NOAA's center is part of the National Weather Service and provides timely and accurate forecasts and watches for severe weather and monitors heavy rain, heavy snow, and fire weather events and issues specific products for those hazards. www.spc.noaa.gov/misc/aboutus.html

Tsunami

TsunamiReady: a program developed by the National Weather Service designed to help cities, towns, counties, universities, and other larger sites in coastal areas reduce the potential for disastrous tsunami-related consequences. www.tsunamiready.noaa.gov

NOAA Center for Tsunami Research: supports research and development of improved methods to predict tsunami impacts on the population and infrastructure of coastal communities. nctr.pmel.noaa.gov/index.html

Tsunami Hazard Maps: the Washington State Department of Natural Resources created tsunami hazard maps for the state. These maps show the modeled tsunami inundation areas based on a Cascadia Subduction Zone Earthquake.

- Anacortes-Whidbey Island Area: www.dnr.wa.gov/Publications/ger_ofr2005-1_tsunami_hazard_anacortes_whidbey.pdf

- Bellingham Area: www.dnr.wa.gov/Publications/ger_ofr2004-15_tsunami_hazard_bellingham.pdf
- Tacoma Area: www.dnr.wa.gov/Publications/ger_ofr2009-9_tsunami_hazard_tacoma.pdf
- Neah Bay Area: www.dnr.wa.gov/Publications/ger_ofr2003-2_tsunami_hazard_neahbay.pdf
- Elliot Bay Area: www.dnr.wa.gov/Publications/ger_ofr2003-14_tsunami_hazard_elliottbay.pdf
- Quileute Area: www.dnr.wa.gov/Publications/ger_ofr2003-1_tsunami_hazard_quileute.pdf
- Southern Coast Area: www.dnr.wa.gov/Publications/ger_gm49_tsunami_hazard_southern_coast.zip
- Port Angeles Area: www.dnr.wa.gov/Publications/ger_ofr2002-1_tsunami_hazard_portangeles.pdf
- Port Townsend Area: www.dnr.wa.gov/Publications/ger_ofr2002-2_tsunami_hazard_porttownsend.pdf

Volcano

USGS Volcano Hazards Program: Links to a multitude of volcano related information including the Cascades Volcano Observatory. volcanoes.usgs.gov

Wildfire

Northwest Coordination Center: covers both Oregon and Washington and serves as the focal point for predictive services for all state and federal agencies involved in wildland fire management and suppression in the region. nwccweb.us

LANDFIRE: compilation of geospatial data products that describe existing vegetation composition and structure, potential vegetation, surface and canopy fuel characteristics, historical fire regimes, and fire regime condition class. www.landfire.gov/index.php

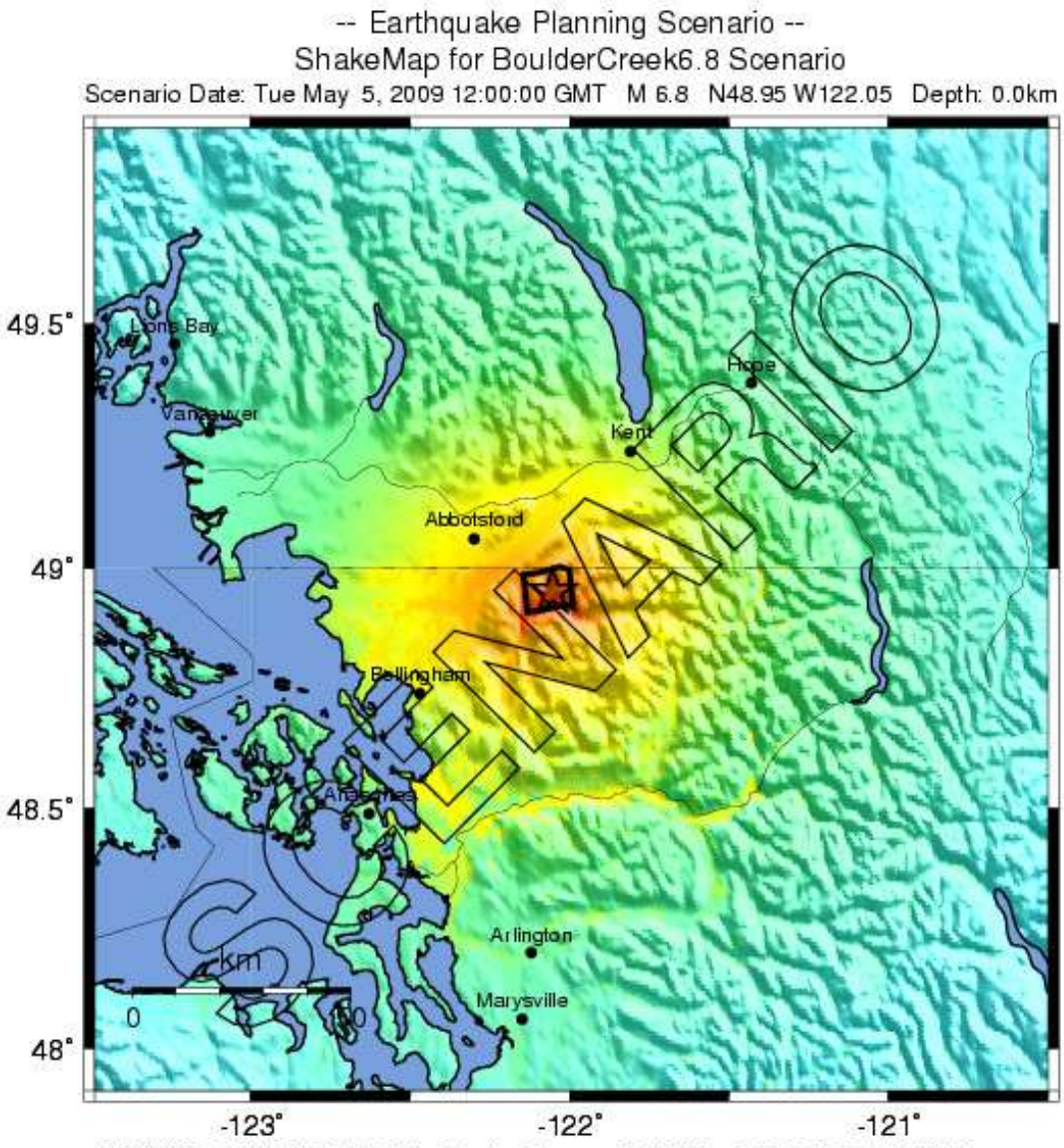
Growth Management – Critical Areas Ordinance Development

In 1995 the GMA was amended to require counties and cities to include the best available science in developing policies and development regulations to protect the functions and values of critical areas (RCW 36.70A.060). The Department of Commerce is required to make available a list of resources that state agencies have identified as meeting the characteristics of the best available science. This publication, *Citations of Recommended Sources of Best Available Science for Designating and Protecting Critical Areas,* meets that requirement and is located at this website: www.commerce.wa.gov/_CTED/documents/ID_874_Publications.pdf

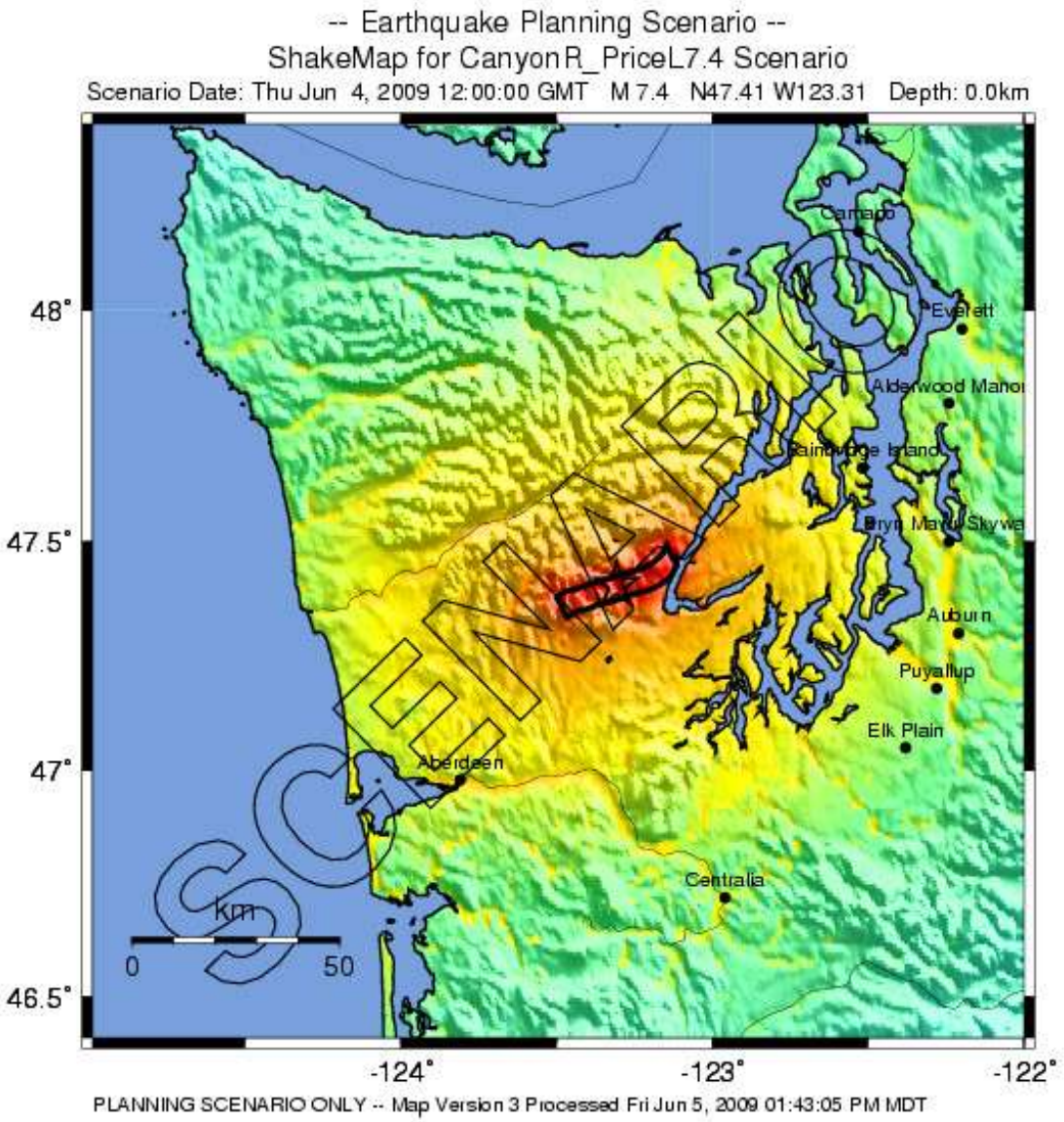
The Department of Commerce maintains the following website that contains additional information on the use of Best Available Science in conducting Growth Management and Critical Areas planning: www.commerce.wa.gov/site/418/default.aspx

ShakeMaps for Washington State:

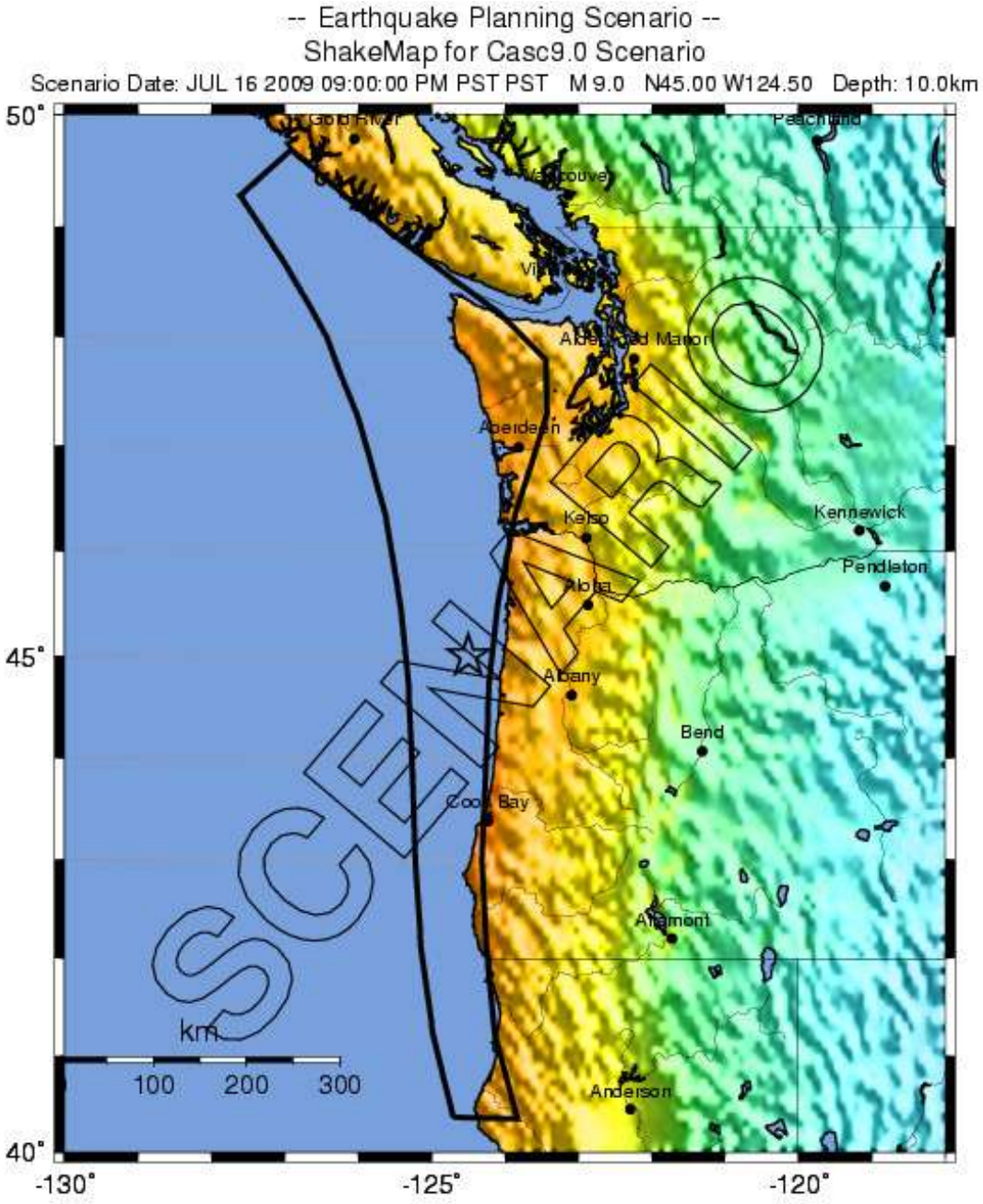
The following pages represent ShakeMaps for various scenarios throughout the state. Additional information is available at the USGS website at: earthquake.usgs.gov/earthquakes/shakemap



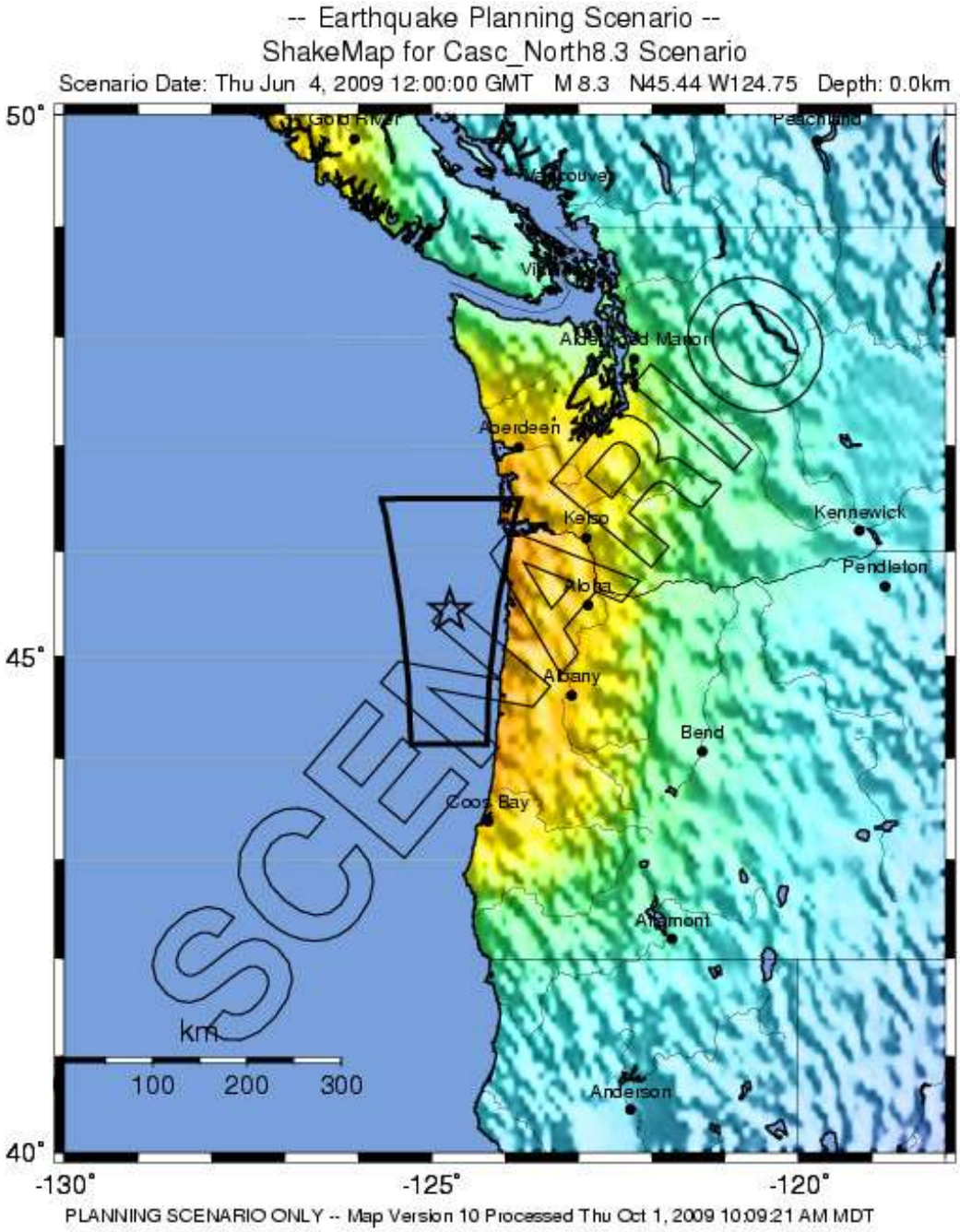
PERCEIVED SHAKING	Not felt	Weak	Light	Moderate	Strong	Very strong	Severe	Violent	Extreme
POTENTIAL DAMAGE	none	none	none	Very light	Light	Moderate	Moderate/Heavy	Heavy	Very Heavy
PEAK ACC.(%g)	*<.17*	*.17-1.4*	*1.4-3.9*	*3.9-9.2*	*9.2-18*	18-34	34-65	65-124	>124
PEAK VEL.(cm/s)	<0.1	0.1-1.1	1.1-3.4	3.4-8.1	*8.1-16*	*16-31*	*31-60*	*60-116*	*>116*
INSTRUMENTAL INTENSITY	I	II-III	IV	V	VI	VII	VIII	IX	X+



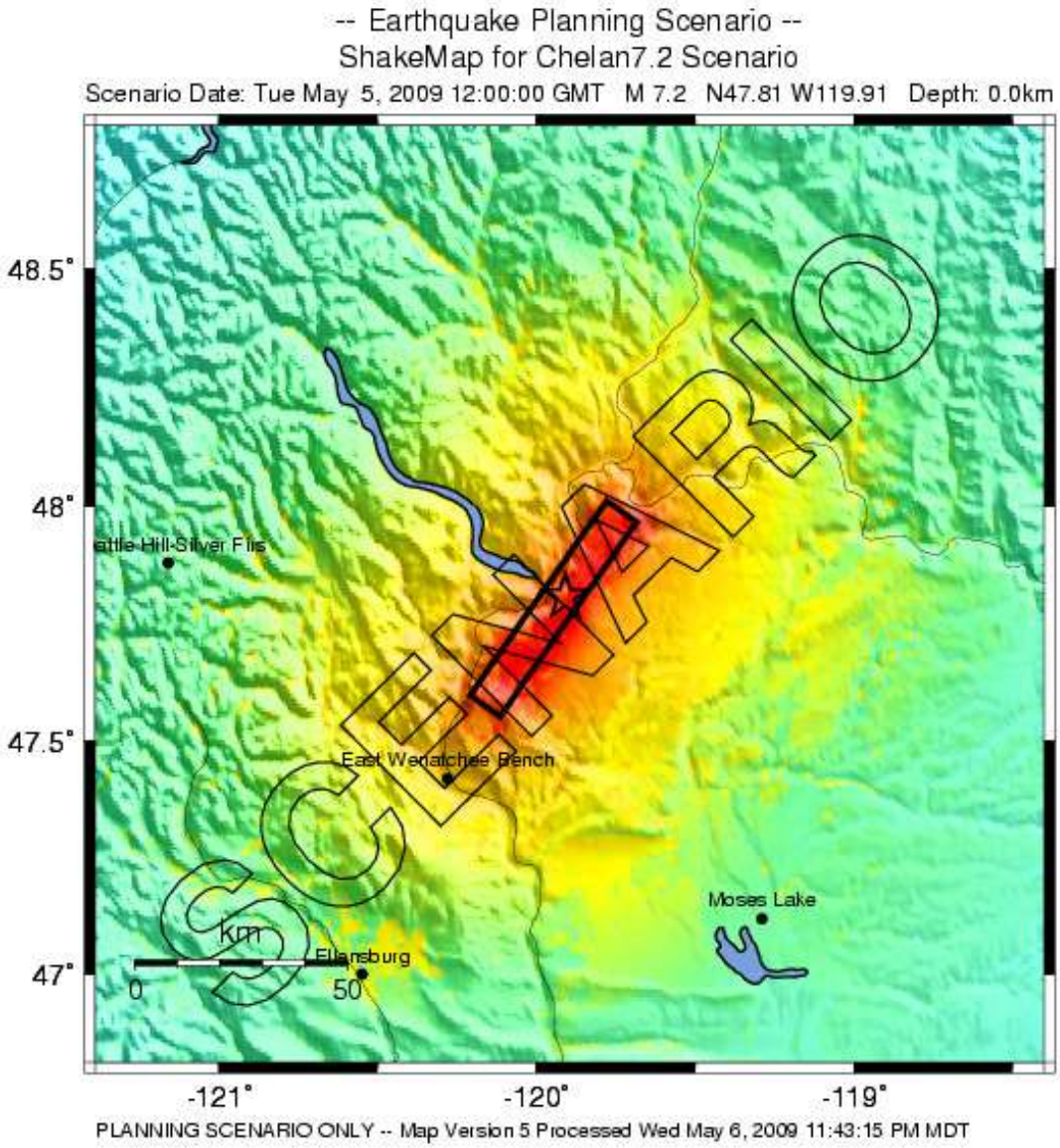
PERCEIVED SHAKING	Not felt	Weak	Light	Moderate	Strong	Very strong	Severe	Violent	Extreme
POTENTIAL DAMAGE	none	none	none	Very light	Light	Moderate	Moderate/Heavy	Heavy	Very Heavy
PEAK ACC.(%g)	*<.17*	*.17-1.4*	*1.4-3.9*	*3.9-9.2*	*9.2-18*	18-34	34-65	65-124	>124
PEAK VEL.(cm/s)	<0.1	0.1-1.1	1.1-3.4	3.4-8.1	*8.1-16*	*16-31*	*31-60*	*60-116*	*>116*
INSTRUMENTAL INTENSITY	I	II-III	IV	V	VI	VII	VIII	IX	X+



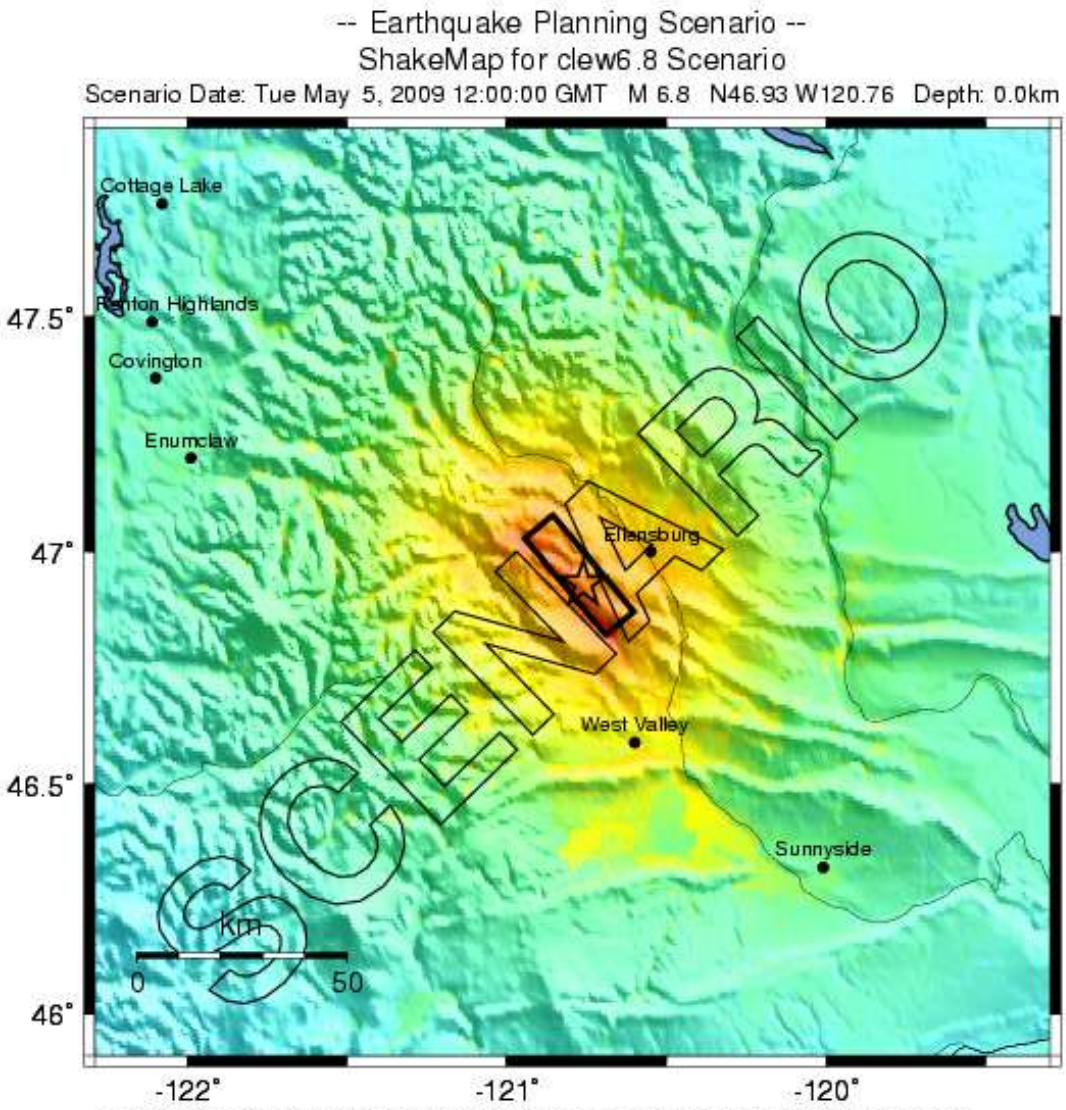
PERCEIVED SHAKING	Not felt	Weak	Light	Moderate	Strong	Very strong	Severe	Violent	Extreme
POTENTIAL DAMAGE	none	none	none	Very light	Light	Moderate	Moderate/Heavy	Heavy	Very Heavy
PEAK ACC.(%g)	*<.17*	*.17-1.4*	*1.4-3.9*	*3.9-9.2*	*9.2-18*	18-34	34-65	65-124	>124
PEAK VEL.(cm/s)	<0.1	0.1-1.1	1.1-3.4	3.4-8.1	*8.1-16*	*16-31*	*31-60*	*60-116*	*>116*
INSTRUMENTAL INTENSITY	I	II-III	IV	V	VI	VII	VIII	IX	X+



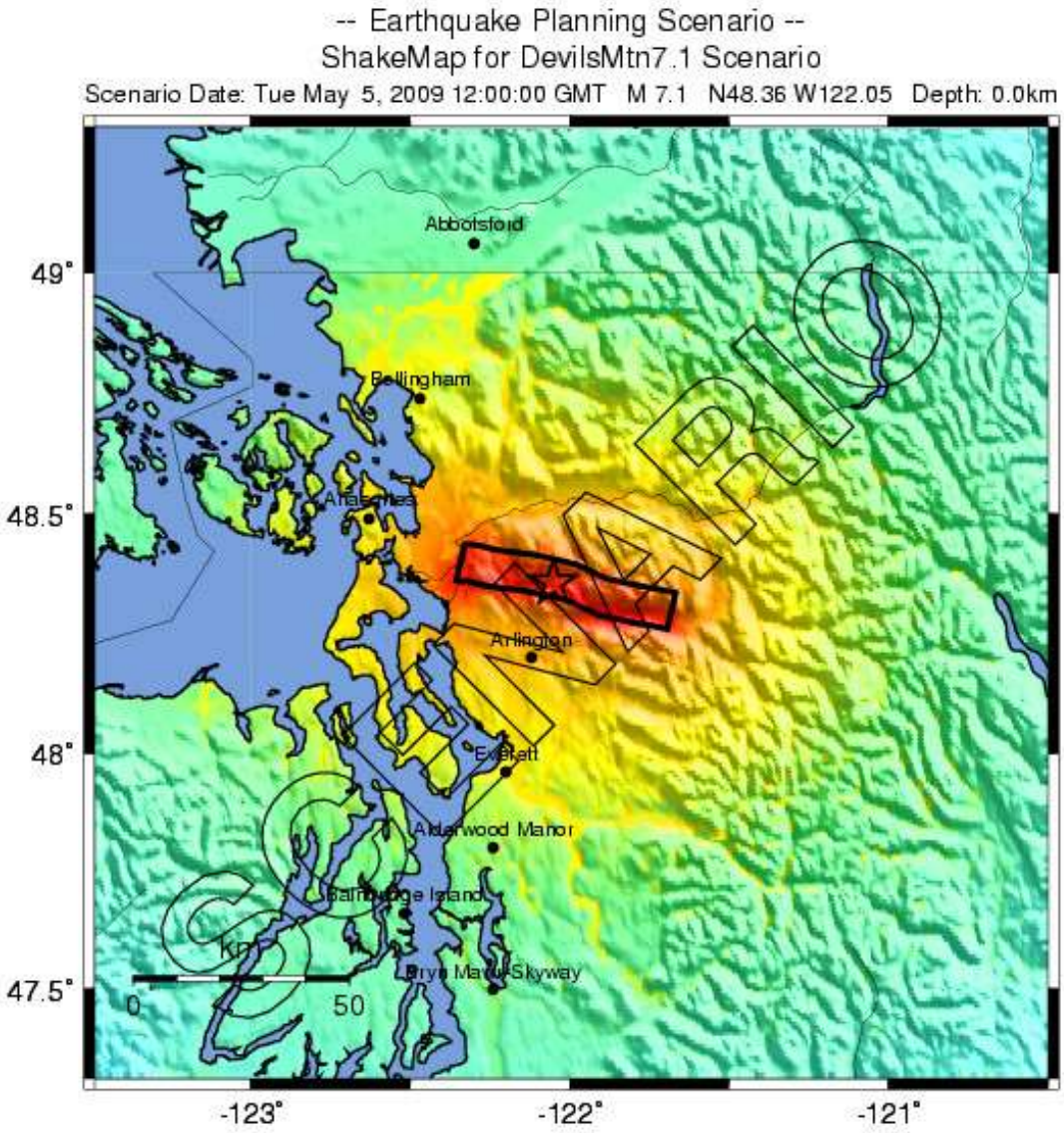
PERCEIVED SHAKING	Not felt	Weak	Light	Moderate	Strong	Very strong	Severe	Violent	Extreme
POTENTIAL DAMAGE	none	none	none	Very light	Light	Moderate	Moderate/Heavy	Heavy	Very Heavy
PEAK ACC.(%g)	*<.17*	*.17-1.4*	*1.4-3.9*	*3.9-9.2*	*9.2-18*	18-34	34-65	65-124	>124
PEAK VEL.(cm/s)	<0.1	0.1-1.1	1.1-3.4	3.4-8.1	*8.1-16*	*16-31*	*31-60*	*60-116*	*>116*
INSTRUMENTAL INTENSITY	I	II-III	IV	V	VI	VII	VIII	IX	X+



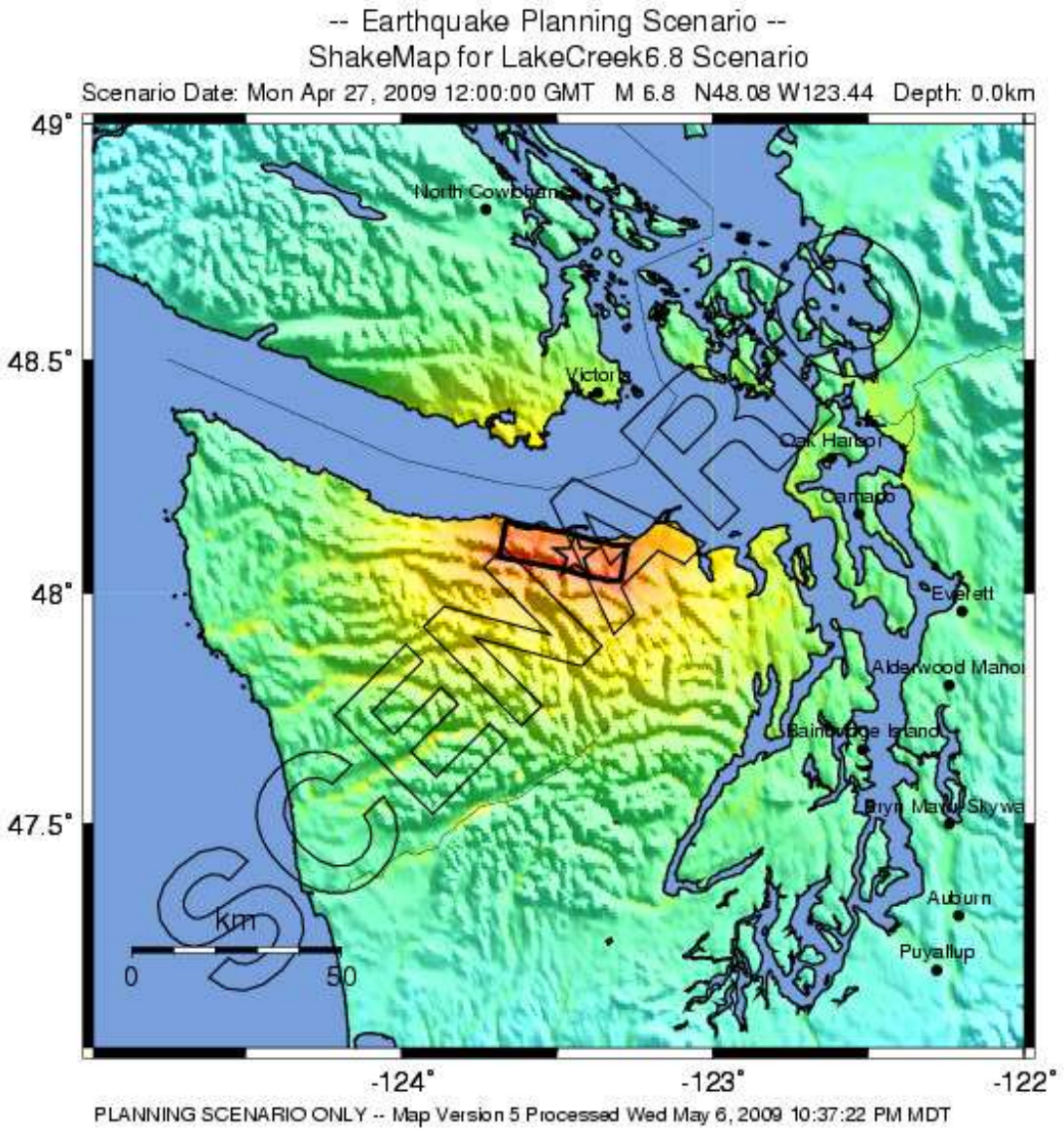
PERCEIVED SHAKING	Not felt	Weak	Light	Moderate	Strong	Very strong	Severe	Violent	Extreme
POTENTIAL DAMAGE	none	none	none	Very light	Light	Moderate	Moderate/Heavy	Heavy	Very Heavy
PEAK ACC.(%g)	*<.17*	*.17-1.4*	*1.4-3.9*	*3.9-9.2*	*9.2-18*	18-34	34-65	65-124	>124
PEAK VEL.(cm/s)	<0.1	0.1-1.1	1.1-3.4	3.4-8.1	*8.1-16*	*16-31*	*31-60*	*60-116*	*>116*
INSTRUMENTAL INTENSITY	I	II-III	IV	V	VI	VII	VIII	IX	X+



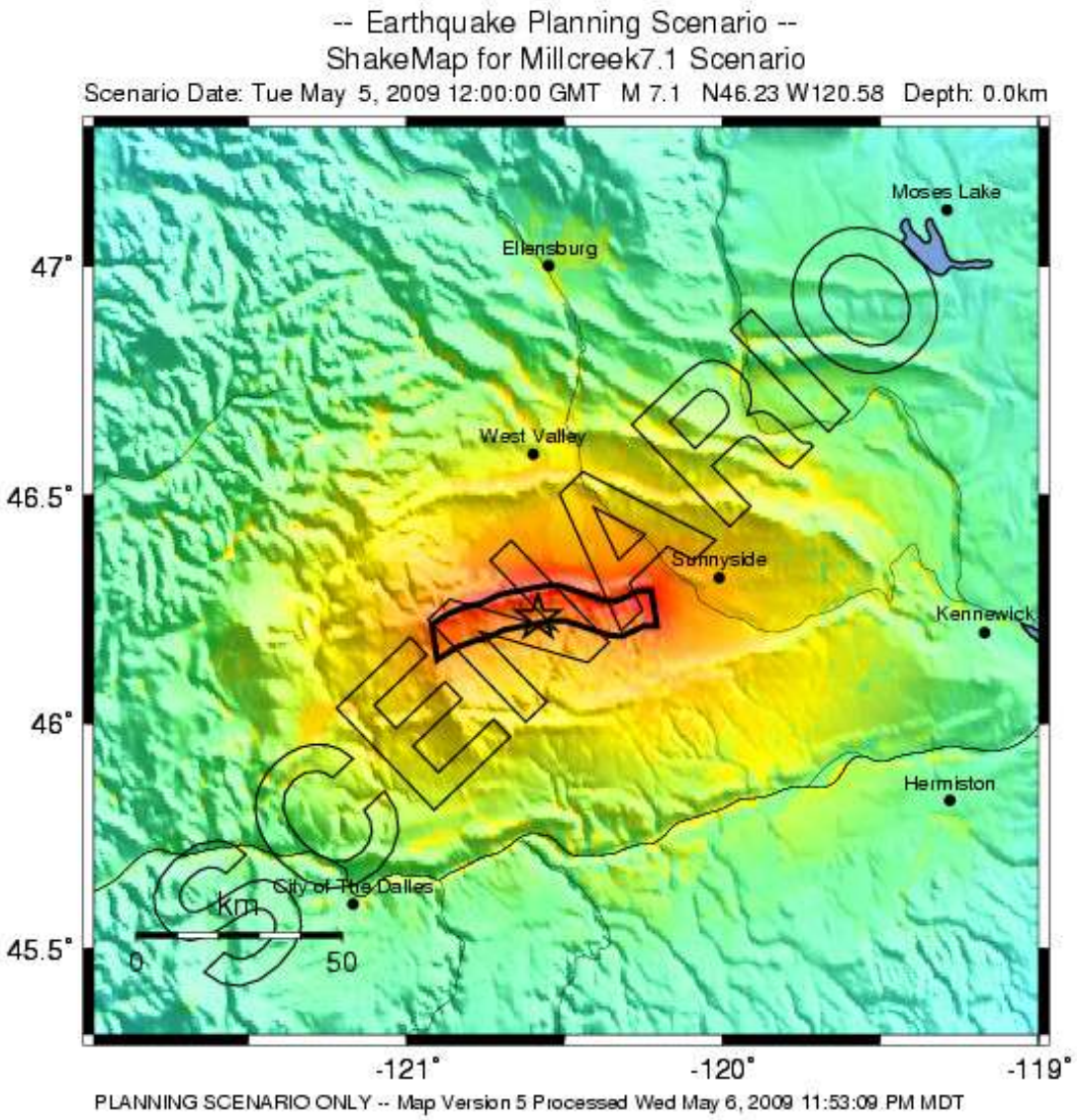
PERCEIVED SHAKING	Not felt	Weak	Light	Moderate	Strong	Very strong	Severe	Violent	Extreme
POTENTIAL DAMAGE	none	none	none	Very light	Light	Moderate	Moderate/Heavy	Heavy	Very Heavy
PEAK ACC.(%g)	*<.17*	*.17-1.4*	*1.4-3.9*	*3.9-9.2*	*9.2-18*	18-34	34-65	65-124	>124
PEAK VEL.(cm/s)	<0.1	0.1-1.1	1.1-3.4	3.4-8.1	*8.1-16*	*16-31*	*31-60*	*60-116*	*>116*
INSTRUMENTAL INTENSITY	I	II-III	IV	V	VI	VII	VIII	IX	X+



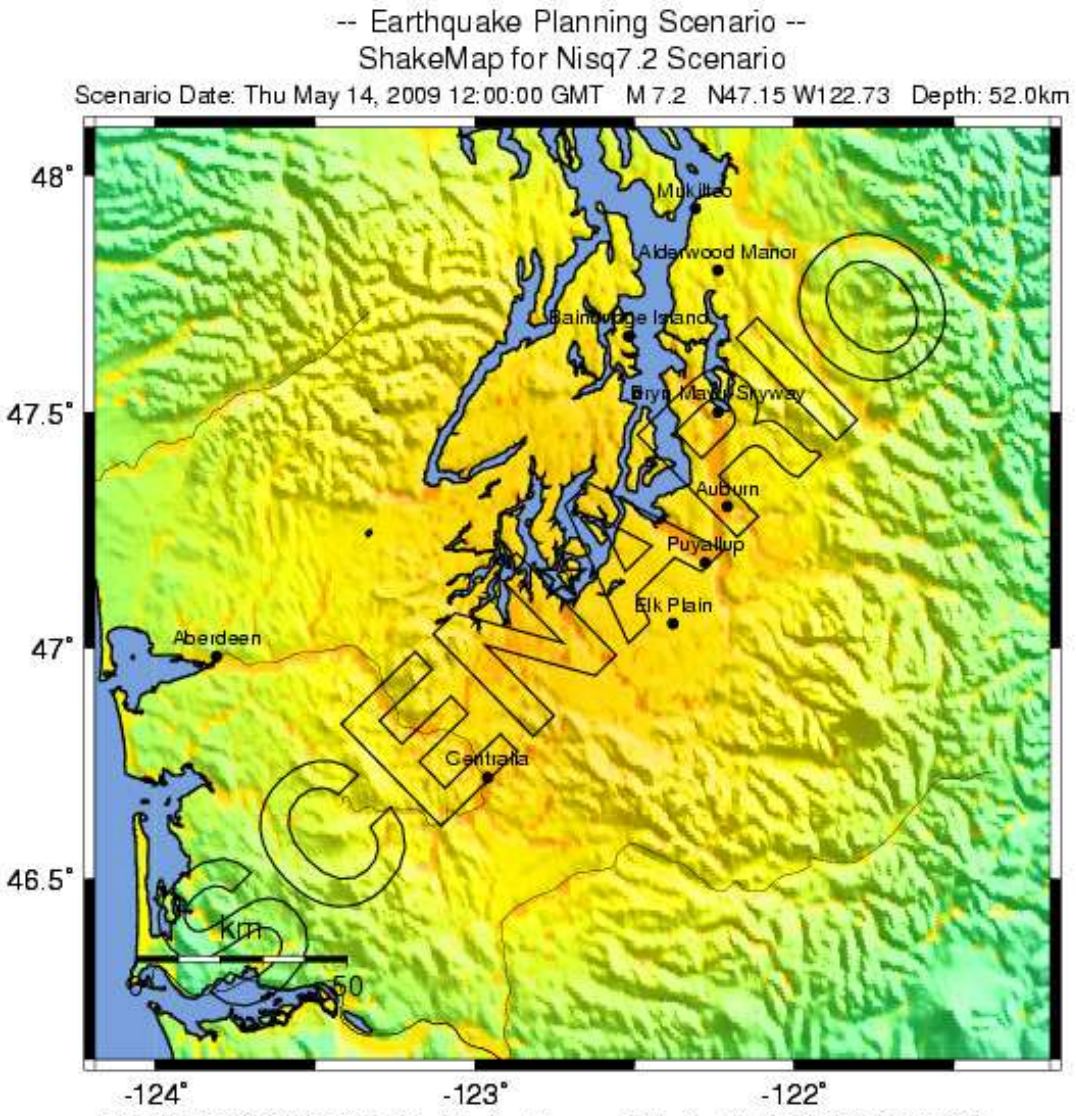
PERCEIVED SHAKING	Not felt	Weak	Light	Moderate	Strong	Very strong	Severe	Violent	Extreme
POTENTIAL DAMAGE	none	none	none	Very light	Light	Moderate	Moderate/Heavy	Heavy	Very Heavy
PEAK ACC.(%g)	*<.17*	*.17-1.4*	*1.4-3.9*	*3.9-9.2*	*9.2-18*	18-34	34-65	65-124	>124
PEAK VEL.(cm/s)	<0.1	0.1-1.1	1.1-3.4	3.4-8.1	*8.1-16*	*16-31*	*31-60*	*60-116*	*>116*
INSTRUMENTAL INTENSITY	I	II-III	IV	V	VI	VII	VIII	IX	X+



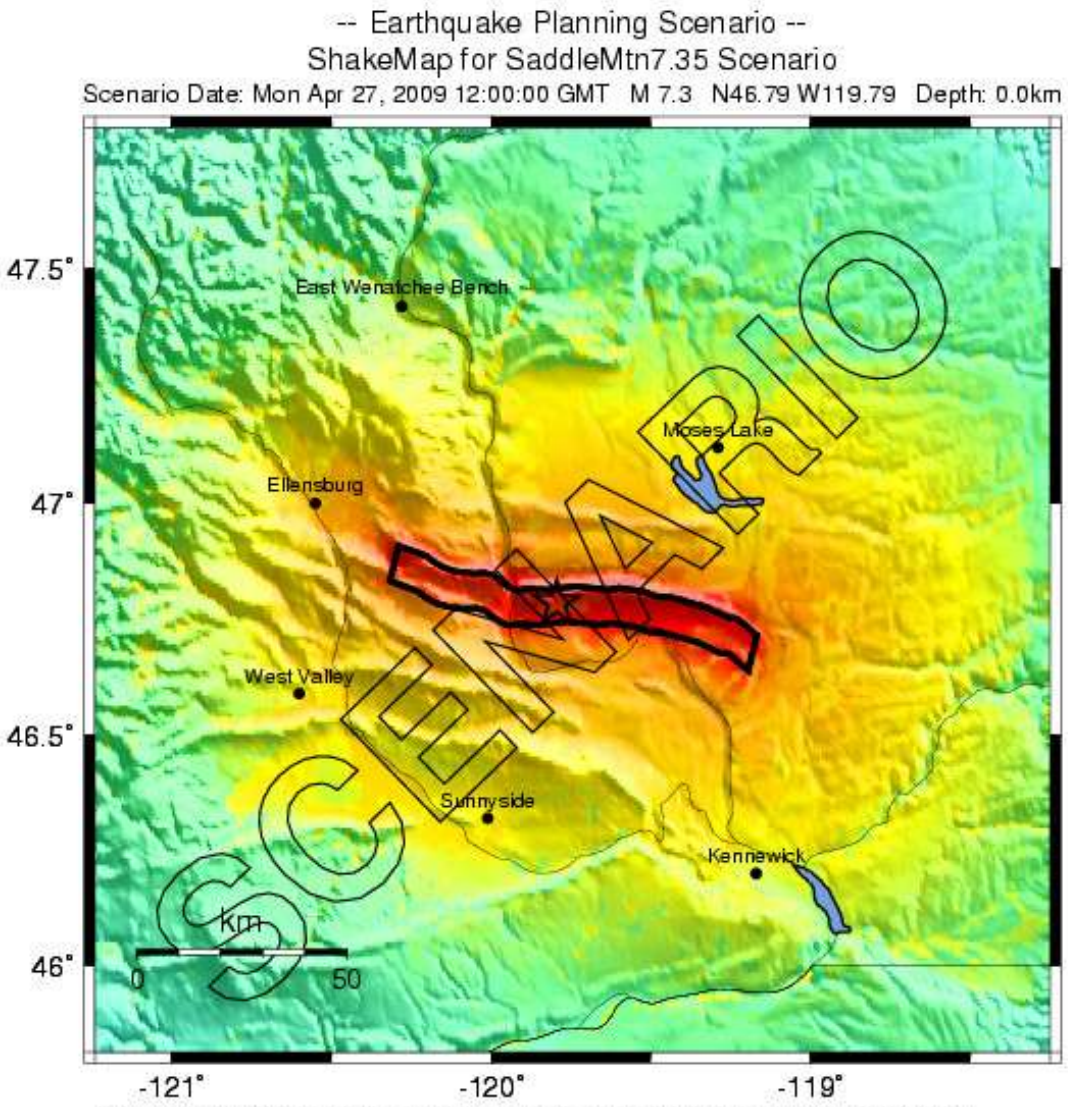
PERCEIVED SHAKING	Not felt	Weak	Light	Moderate	Strong	Very strong	Severe	Violent	Extreme
POTENTIAL DAMAGE	none	none	none	Very light	Light	Moderate	Moderate/Heavy	Heavy	Very Heavy
PEAK ACC.(%g)	*<.17*	*.17-1.4*	*1.4-3.9*	*3.9-9.2*	*9.2-18*	18-34	34-65	65-124	>124
PEAK VEL.(cm/s)	<0.1	0.1-1.1	1.1-3.4	3.4-8.1	*8.1-16*	*16-31*	*31-60*	*60-116*	*>116*
INSTRUMENTAL INTENSITY	I	II-III	IV	V	VI	VII	VIII	IX	X+



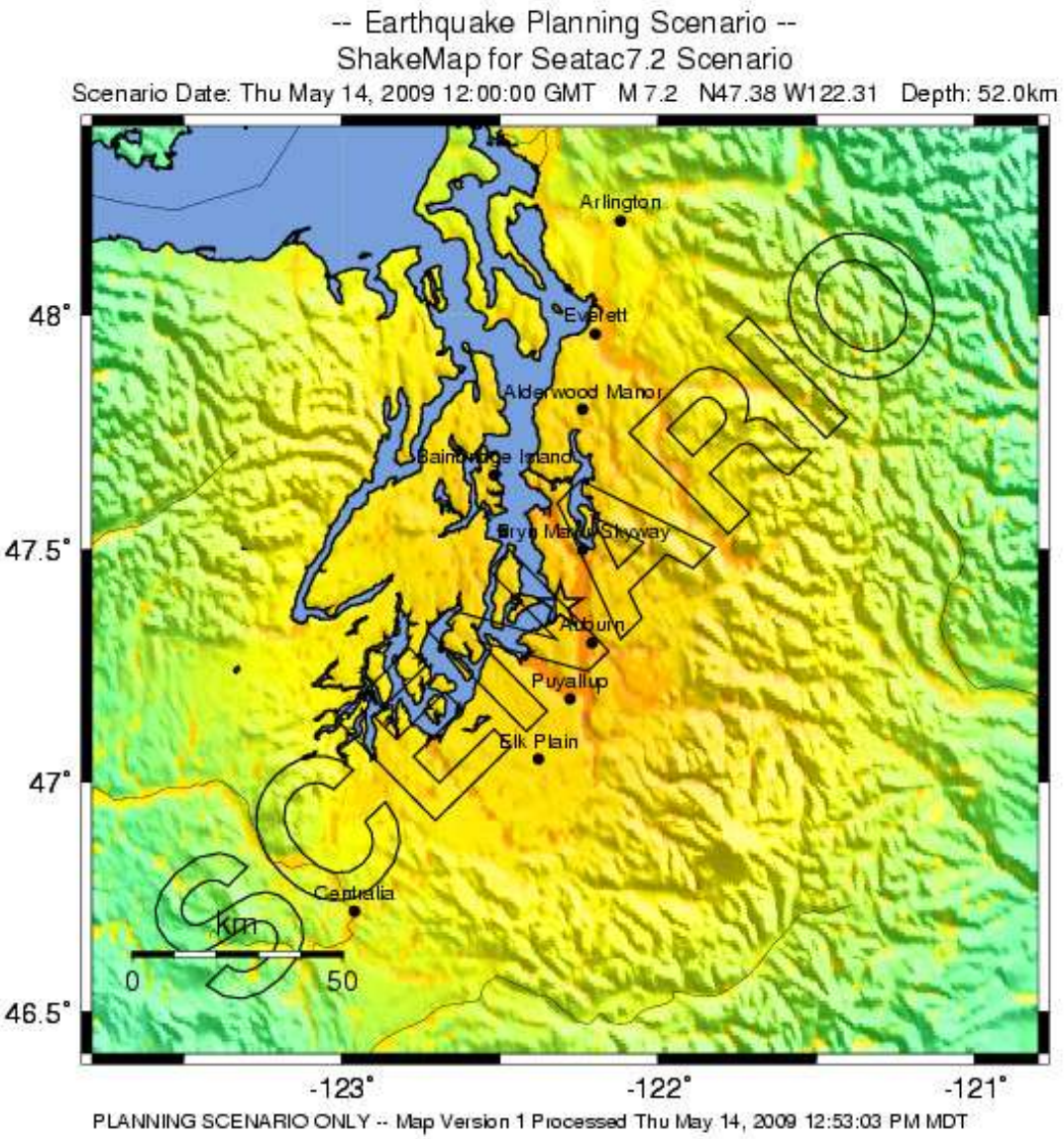
PERCEIVED SHAKING	Not felt	Weak	Light	Moderate	Strong	Very strong	Severe	Violent	Extreme
POTENTIAL DAMAGE	none	none	none	Very light	Light	Moderate	Moderate/Heavy	Heavy	Very Heavy
PEAK ACC.(%g)	*<.17*	*.17-1.4*	*1.4-3.9*	*3.9-9.2*	*9.2-18*	18-34	34-65	65-124	>124
PEAK VEL.(cm/s)	<0.1	0.1-1.1	1.1-3.4	3.4-8.1	*8.1-16*	*16-31*	*31-60*	*60-116*	*>116*
INSTRUMENTAL INTENSITY	I	II-III	IV	V	VI	VII	VIII	IX	X+



PERCEIVED SHAKING	Not felt	Weak	Light	Moderate	Strong	Very strong	Severe	Violent	Extreme
POTENTIAL DAMAGE	none	none	none	Very light	Light	Moderate	Moderate/Heavy	Heavy	Very Heavy
PEAK ACC.(%g)	*<.17*	*.17-1.4*	*1.4-3.9*	*3.9-9.2*	*9.2-18*	18-34	34-65	65-124	>124
PEAK VEL.(cm/s)	<0.1	0.1-1.1	1.1-3.4	3.4-8.1	*8.1-16*	*16-31*	*31-60*	*60-116*	*>116*
INSTRUMENTAL INTENSITY	I	II-III	IV	V	VI	VII	VIII	IX	X+

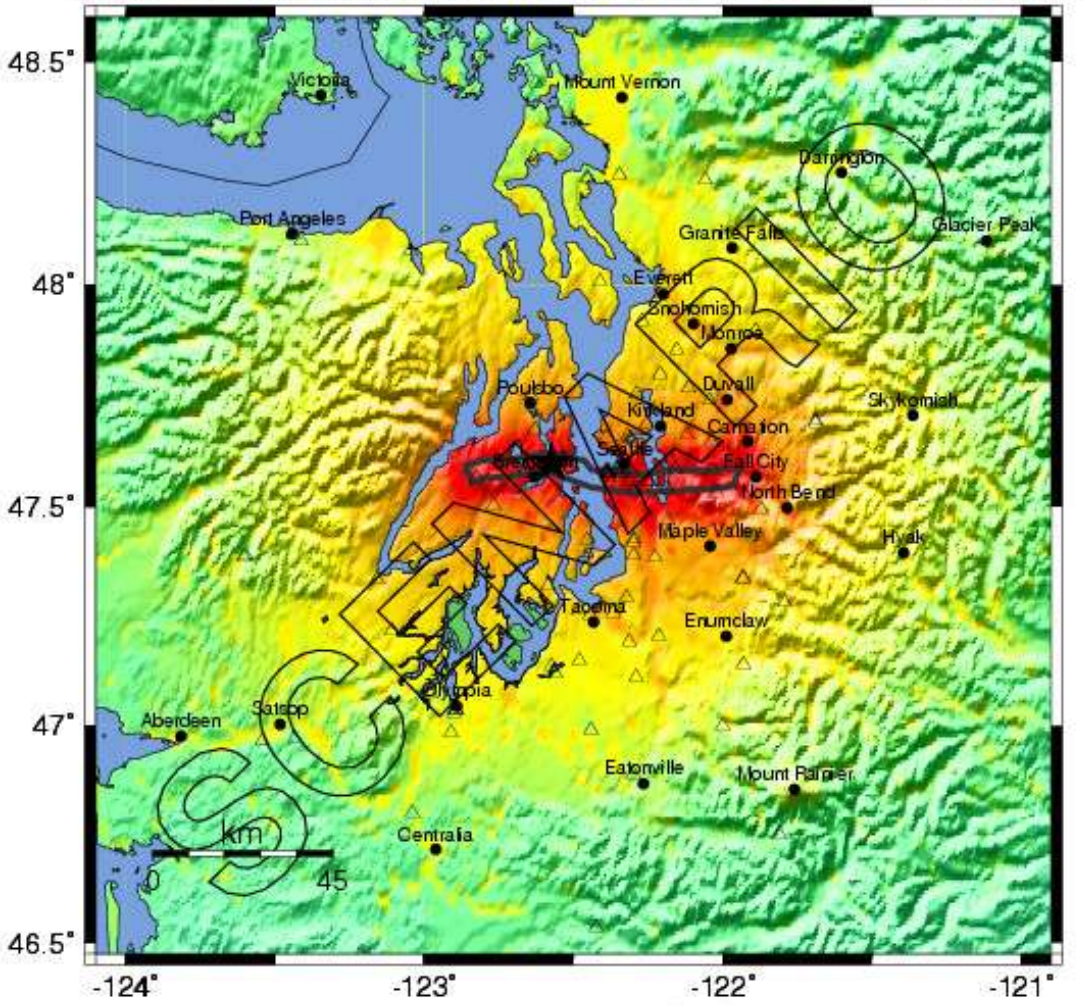


PERCEIVED SHAKING	Not felt	Weak	Light	Moderate	Strong	Very strong	Severe	Violent	Extreme
POTENTIAL DAMAGE	none	none	none	Very light	Light	Moderate	Moderate/Heavy	Heavy	Very Heavy
PEAK ACC.(%g)	*<.17*	*.17-1.4*	*1.4-3.9*	*3.9-9.2*	*9.2-18*	18-34	34-65	65-124	>124
PEAK VEL.(cm/s)	<0.1	0.1-1.1	1.1-3.4	3.4-8.1	*8.1-16*	*16-31*	*31-60*	*60-116*	*>116*
INSTRUMENTAL INTENSITY	I	II-III	IV	V	VI	VII	VIII	IX	X+



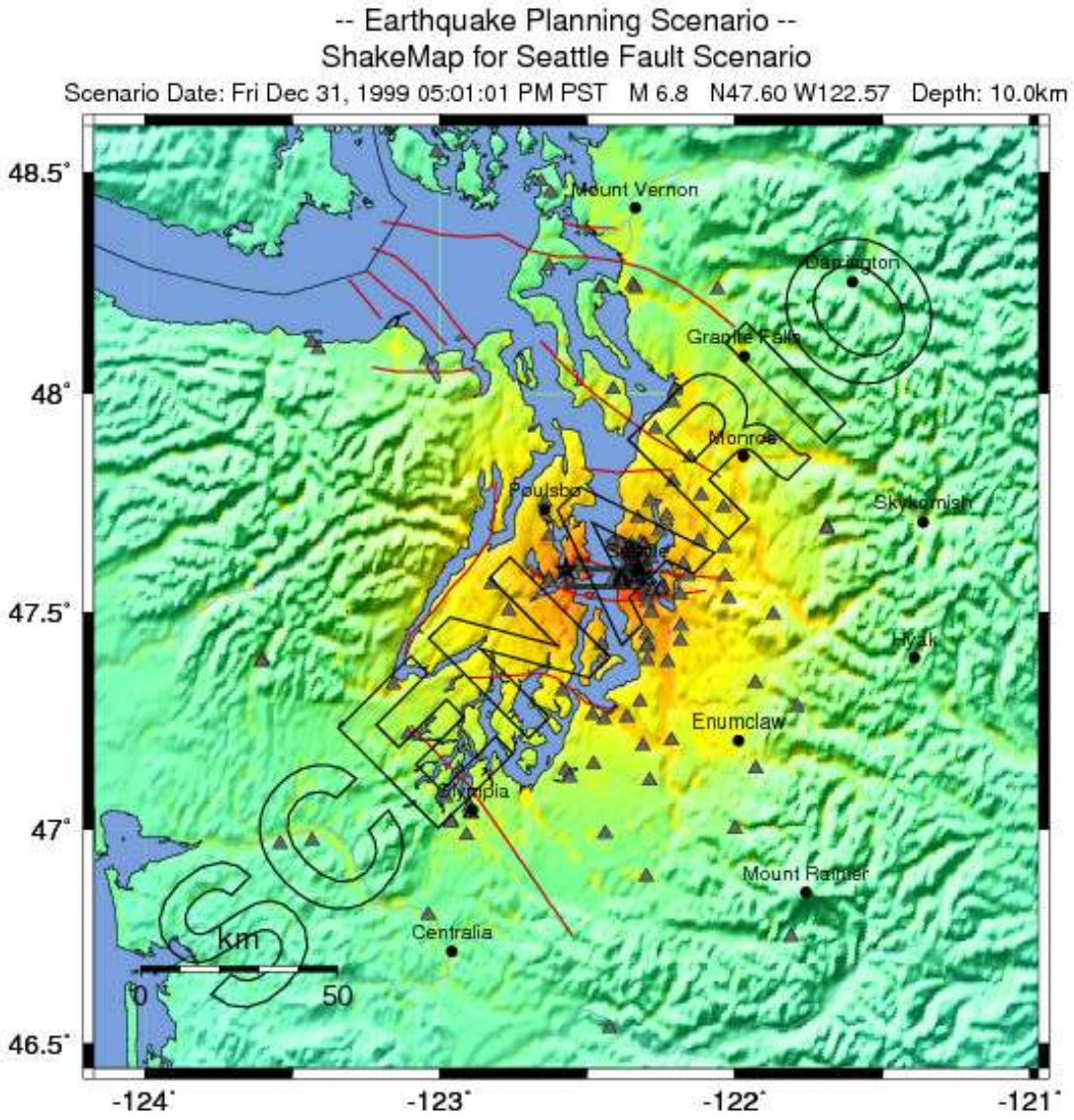
PERCEIVED SHAKING	Not felt	Weak	Light	Moderate	Strong	Very strong	Severe	Violent	Extreme
POTENTIAL DAMAGE	none	none	none	Very light	Light	Moderate	Moderate/Heavy	Heavy	Very Heavy
PEAK ACC.(%g)	*<.17*	*.17-1.4*	*1.4-3.9*	*3.9-9.2*	*9.2-18*	18-34	34-65	65-124	>124
PEAK VEL.(cm/s)	<0.1	0.1-1.1	1.1-3.4	3.4-8.1	*8.1-16*	*16-31*	*31-60*	*60-116*	*>116*
INSTRUMENTAL INTENSITY	I	II-III	IV	V	VI	VII	VIII	IX	X+

-- Earthquake Planning Scenario --
Rapid Instrumental Intensity Map for Seattle Art Scenario
Scenario Date: Sat Jan 1, 2000 12:01:01 AM PST M 7.2 N47.60 W122.57 Depth: 10.0km

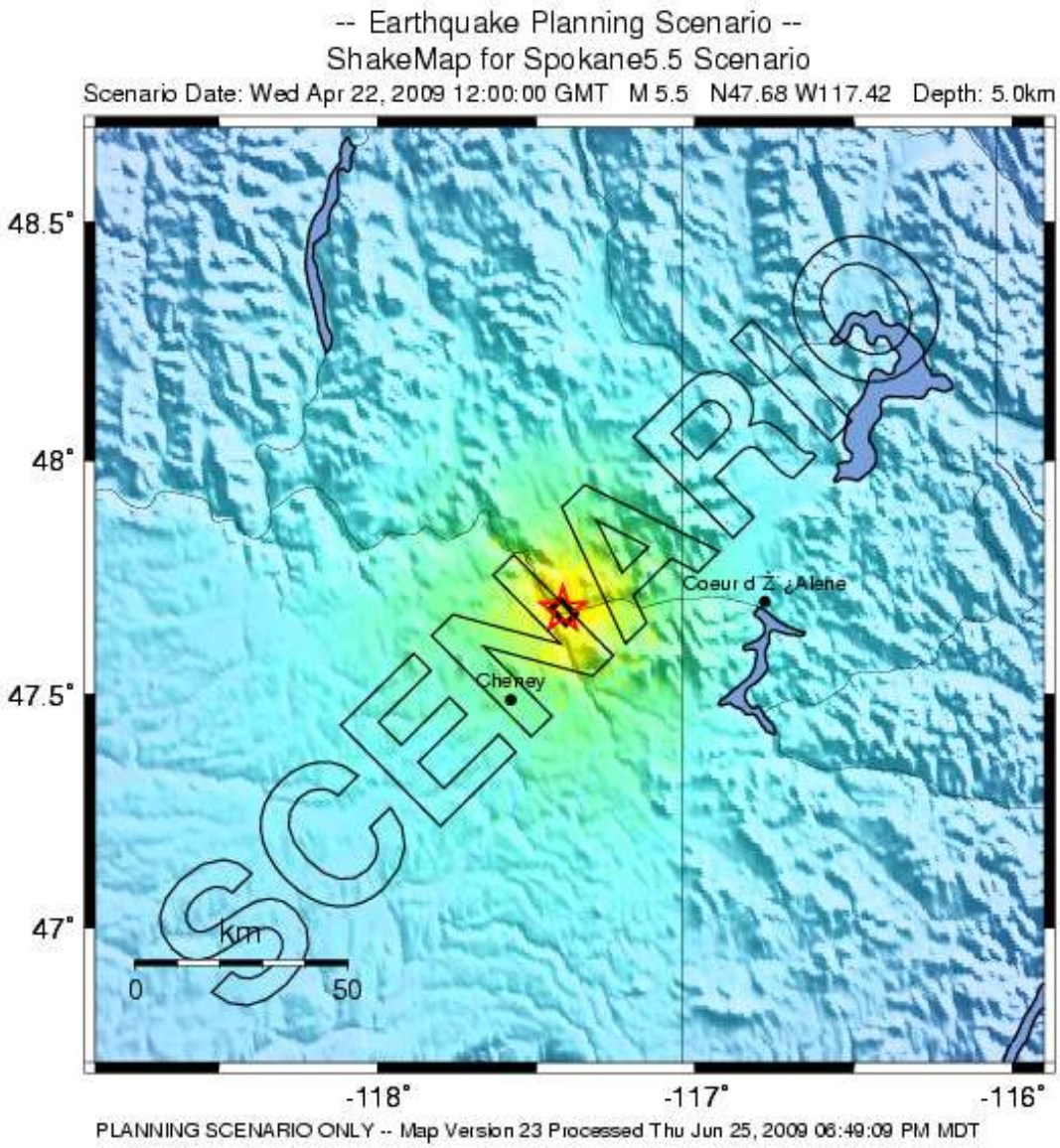


PLANNING SCENARIO ONLY -- PROCESSED: Fri Jan 2, 2004 03:42:37 PM PST

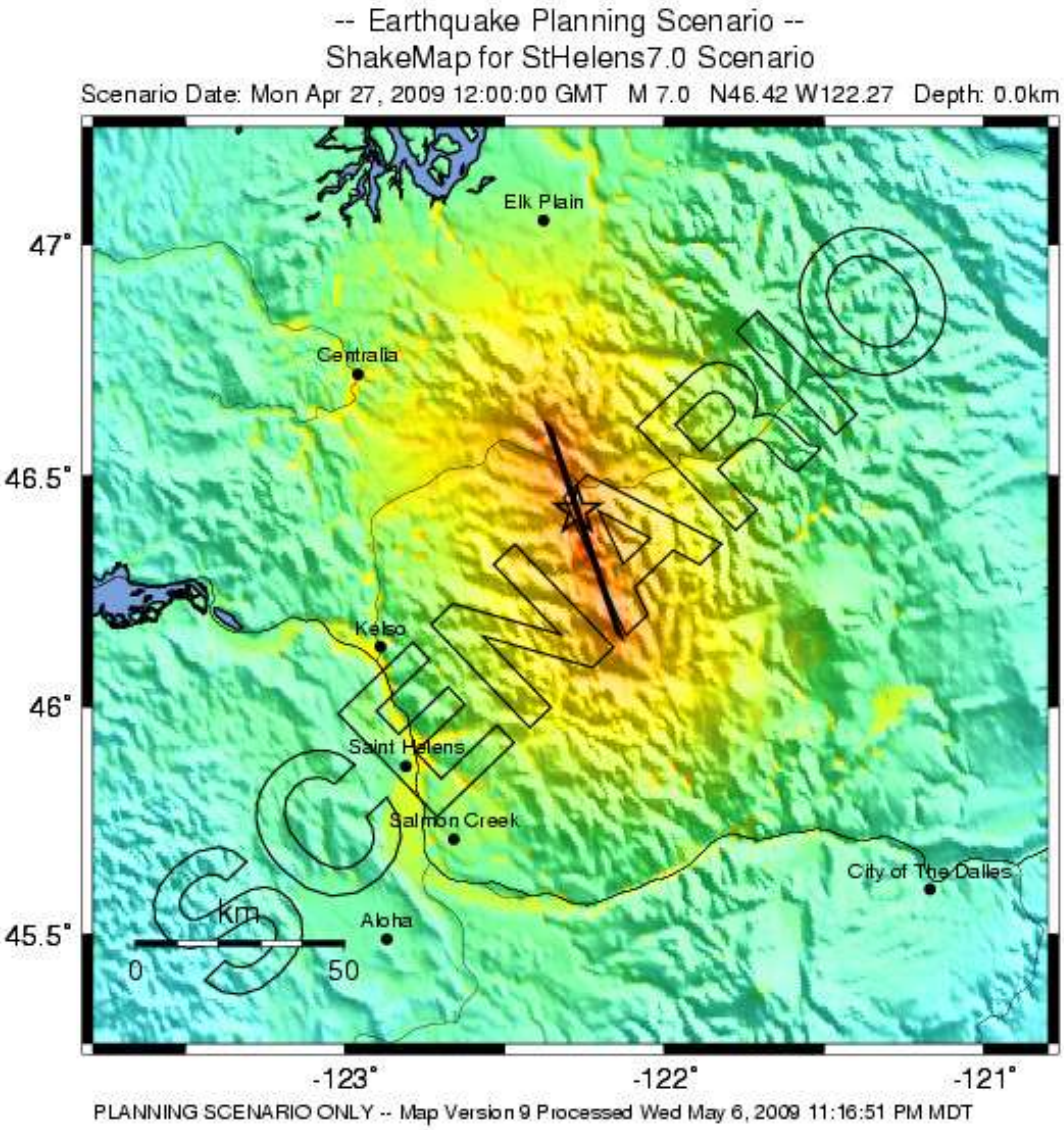
PERCEIVED SHAKING	Not felt	Weak	Light	Moderate	Strong	Very strong	Severe	Violent	Extreme
POTENTIAL DAMAGE	none	none	none	Very light	Light	Moderate	Moderate/Heavy	Heavy	Very Heavy
PEAK ACC.(%g)	*<.17*	*.17-1.4*	*1.4-3.9*	*3.9-9.2*	*9.2-18*	18-34	34-65	65-124	>124
PEAK VEL.(cm/s)	<0.1	0.1-1.1	1.1-3.4	3.4-8.1	8.1-16	*16-31*	*31-60*	*60-116*	*>116*
INSTRUMENTAL INTENSITY	I	II-III	IV	V	VI	VII	VIII	IX	X+



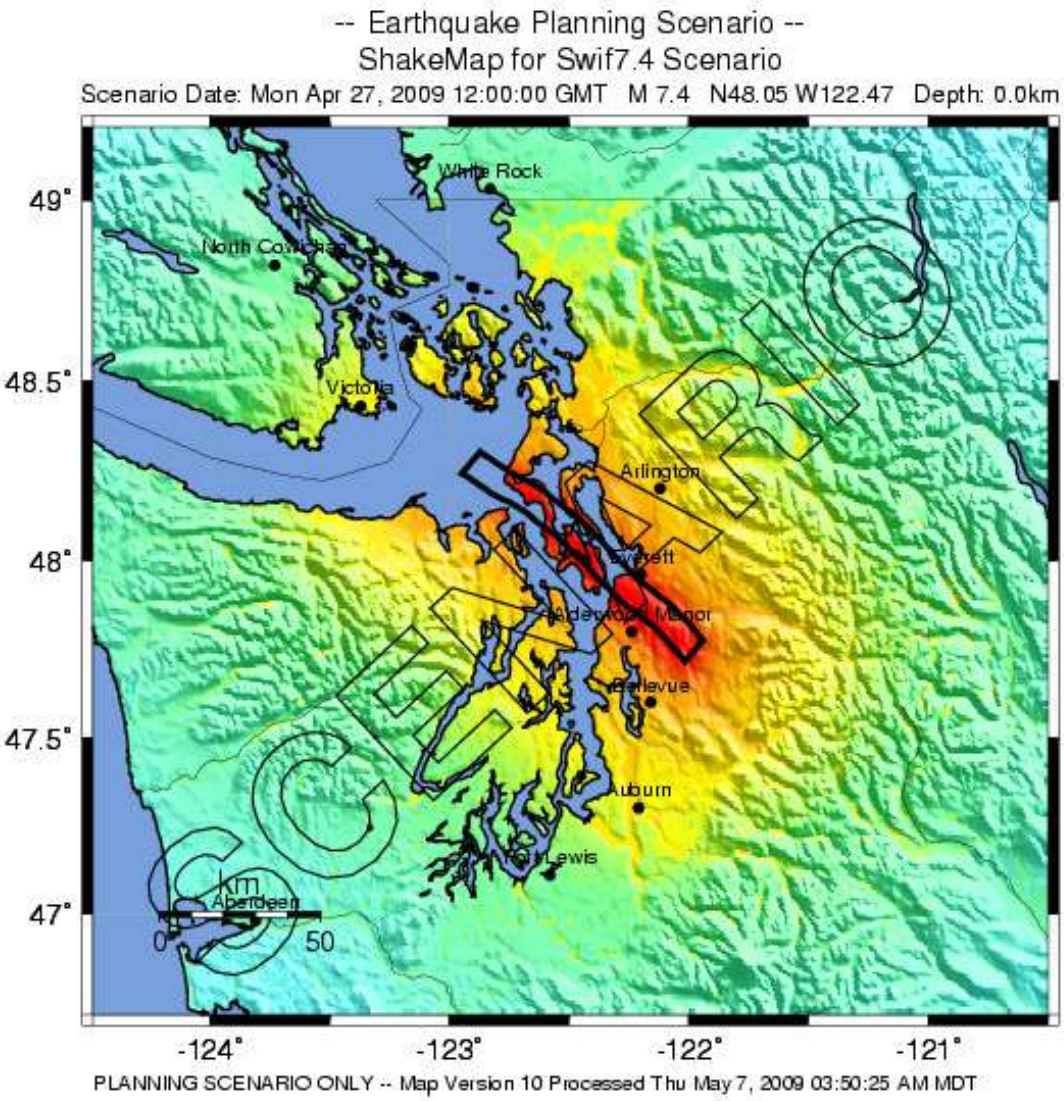
PERCEIVED SHAKING	Not felt	Weak	Light	Moderate	Strong	Very strong	Severe	Violent	Extreme
POTENTIAL DAMAGE	none	none	none	Very light	Light	Moderate	Moderate/Heavy	Heavy	Very Heavy
PEAK ACC.(%g)	*<.17*	*.17-1.4*	*1.4-3.9*	*3.9-9.2*	*9.2-18*	18-34	34-65	65-124	>124
PEAK VEL.(cm/s)	<0.1	0.1-1.1	1.1-3.4	3.4-8.1	*8.1-16*	*16-31*	*31-60*	*60-116*	*>116*
INSTRUMENTAL INTENSITY	I	II-III	IV	V	VI	VII	VIII	IX	X+



PERCEIVED SHAKING	Not felt	Weak	Light	Moderate	Strong	Very strong	Severe	Violent	Extreme
POTENTIAL DAMAGE	none	none	none	Very light	Light	Moderate	Moderate/Heavy	Heavy	Very Heavy
PEAK ACC.(%g)	*<.17*	*.17-1.4*	*1.4-3.9*	*3.9-9.2*	*9.2-18*	18-34	34-65	65-124	>124
PEAK VEL.(cm/s)	<0.1	0.1-1.1	1.1-3.4	3.4-8.1	*8.1-16*	*16-31*	*31-60*	*60-116*	*>116*
INSTRUMENTAL INTENSITY	I	II-III	IV	V	VI	VII	VIII	IX	X+

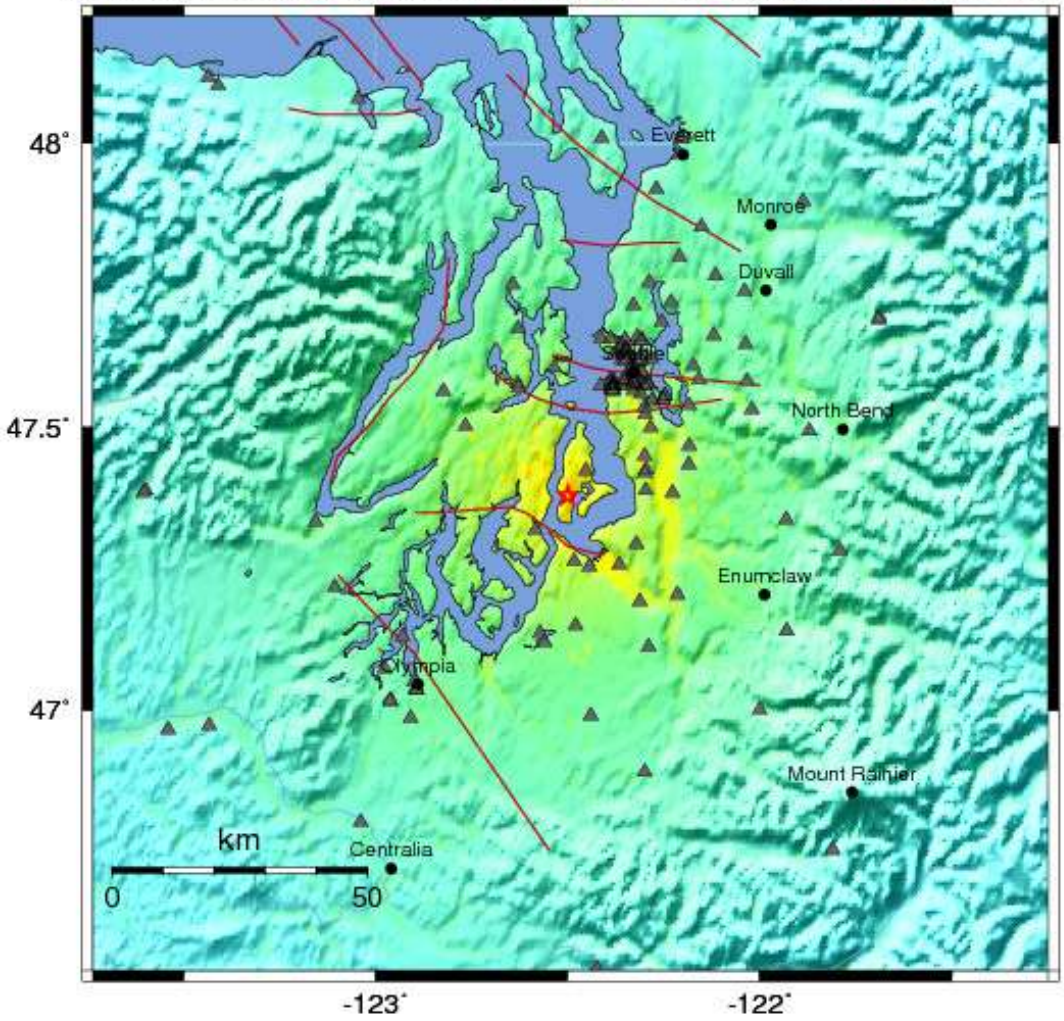


PERCEIVED SHAKING	Not felt	Weak	Light	Moderate	Strong	Very strong	Severe	Violent	Extreme
POTENTIAL DAMAGE	none	none	none	Very light	Light	Moderate	Moderate/Heavy	Heavy	Very Heavy
PEAK ACC.(%g)	*<.17*	*.17-1.4*	*1.4-3.9*	*3.9-9.2*	*9.2-18*	18-34	34-65	65-124	>124
PEAK VEL.(cm/s)	<0.1	0.1-1.1	1.1-3.4	3.4-8.1	*8.1-16*	*16-31*	*31-60*	*60-116*	*>116*
INSTRUMENTAL INTENSITY	I	II-III	IV	V	VI	VII	VIII	IX	X+



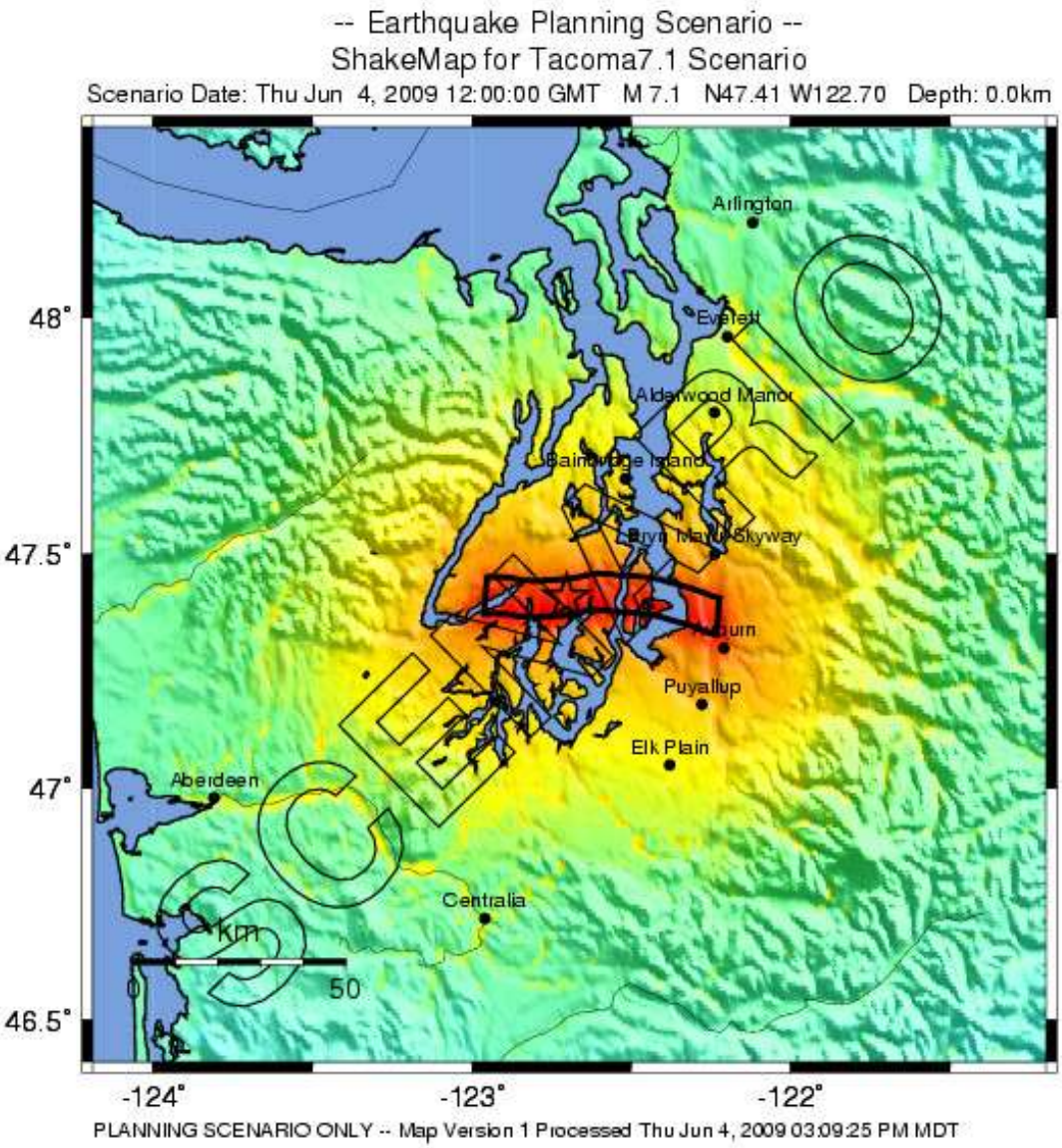
PERCEIVED SHAKING	Not felt	Weak	Light	Moderate	Strong	Very strong	Severe	Violent	Extreme
POTENTIAL DAMAGE	none	none	none	Very light	Light	Moderate	Moderate/Heavy	Heavy	Very Heavy
PEAK ACC.(%g)	*<.17*	*.17-1.4*	*1.4-3.9*	*3.9-9.2*	*9.2-18*	18-34	34-65	65-124	>124
PEAK VEL.(cm/s)	<0.1	0.1-1.1	1.1-3.4	3.4-8.1	*8.1-16*	*16-31*	*31-60*	*60-116*	*>116*
INSTRUMENTAL INTENSITY	I	II-III	IV	V	VI	VII	VIII	IX	X+

-- Earthquake Planning Scenario --
ShakeMap for Tacoma Fault M5.5 Aftershock Scenario
Scenario Date: Thu Dec 31, 2009 05:01:01 PM PST M 5.5 N47.38 W122.50 Depth: 0.0km



PLANNING SCENARIO ONLY -- Map Version 1 Processed Thu Sep 17, 2009 01:01:16 PM PDT

PERCEIVED SHAKING	Not felt	Weak	Light	Moderate	Strong	Very strong	Severe	Violent	Extreme
POTENTIAL DAMAGE	none	none	none	Very light	Light	Moderate	Moderate/Heavy	Heavy	Very Heavy
PEAK ACC.(%g)	*<.17*	*.17-1.4*	*1.4-3.9*	*3.9-9.2*	*9.2-18*	18-34	34-65	65-124	>124
PEAK VEL.(cm/s)	<0.1	0.1-1.1	1.1-3.4	3.4-8.1	*8.1-16*	*16-31*	*31-60*	*60-116*	*>116*
INSTRUMENTAL INTENSITY	I	II-III	IV	V	VI	VII	VIII	IX	X+



PERCEIVED SHAKING	Not felt	Weak	Light	Moderate	Strong	Very strong	Severe	Violent	Extreme
POTENTIAL DAMAGE	none	none	none	Very light	Light	Moderate	Moderate/Heavy	Heavy	Very Heavy
PEAK ACC.(%g)	*<.17*	*.17-1.4*	*1.4-3.9*	*3.9-9.2*	*9.2-18*	18-34	34-65	65-124	>124
PEAK VEL.(cm/s)	<0.1	0.1-1.1	1.1-3.4	3.4-8.1	*8.1-16*	*16-31*	*31-60*	*60-116*	*>116*
INSTRUMENTAL INTENSITY	I	II-III	IV	V	VI	VII	VIII	IX	X+